

Technology Development for High-Actuator-Count MEMS DM Systems, Phase I

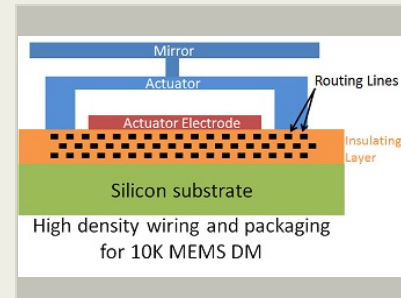
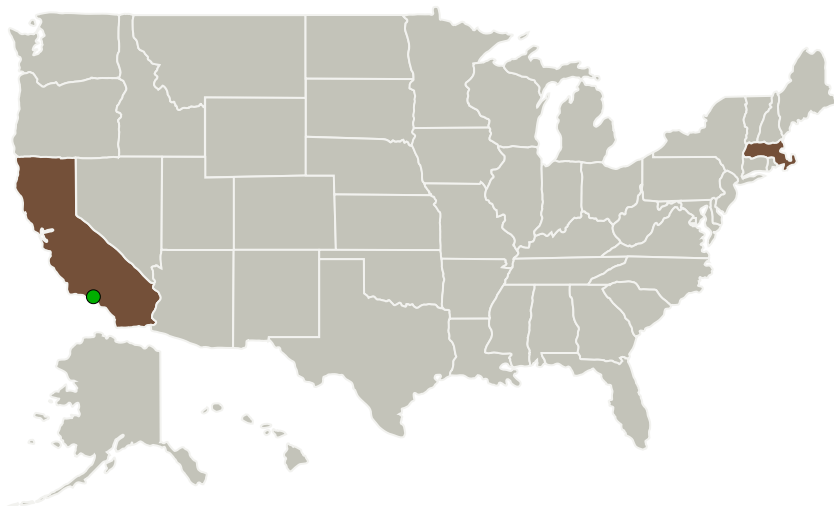
Completed Technology Project (2017 - 2017)



Project Introduction

We propose to develop a design and manufacturing approach for a small-stroke, high-precision deformable mirror scalable to 10,000 actuators, that promises inherent advantages in scalability, yield, and reliability in comparison to current generation microelectromechanical systems (MEMS) DMs, to address a technology gap for next-generation planet finding instruments. Our proposed design aims to ensure high yield while maintaining a superb optical quality and retain the proven aspects of BMC's commercial MEMS DM design and core manufacturing processes. Our objective in the Phase I project is to complete a design study for an innovative approach to scaling up our MEMS DM technology. We will develop new approaches to design and fabrication of routing lines by replacing the single wiring layer by interconnected, stacked wiring layers, and replacing wirebond technology with a flip-chip architecture for the device-to-package integration to overcome two key challenges that currently limit MEMS DM scalability to higher actuator counts. The outcome of the Phase I work will be the design and mask layout of the 10,000 actuator DM, the design and layout of the 10,000 channel PCB subassembly, and the development of a flip-chip bonding process that will enable the fabrication of this DM in a Phase II effort.

Primary U.S. Work Locations and Key Partners



Technology Development for High-Actuator-Count MEMS DM Systems, Phase I Briefing Chart Image

Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Images	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	3

Technology Development for High-Actuator-Count MEMS DM Systems, Phase I

Completed Technology Project (2017 - 2017)

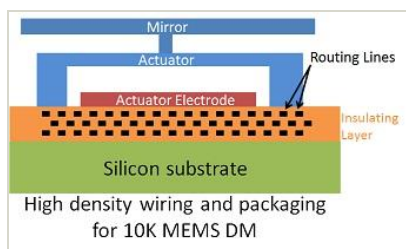


Organizations Performing Work	Role	Type	Location
Boston Micromachines Corporation	Lead Organization	Industry	Cambridge, Massachusetts
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations

California	Massachusetts
------------	---------------

Images



Briefing Chart Image

Technology Development for High-Actuator-Count MEMS DM Systems, Phase I Briefing Chart Image (<https://techport.nasa.gov/image/129784>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Boston Micromachines Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

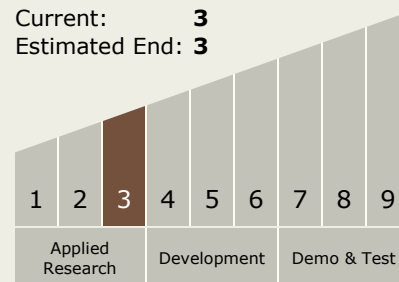
Carlos Torrez

Principal Investigator:

Peter J Ryan

Technology Maturity (TRL)

Start: **3**
Current: **3**
Estimated End: **3**



Technology Development for High-Actuator-Count MEMS DM Systems, Phase I

Completed Technology Project (2017 - 2017)



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.3 Optical Components